and fertility of interspecific hybrids, growth rates under different experimental conditions, phenotypic variability, phenotypic plasticity, and requirements for seed germination have been described in the previously cited publications.

Acknowledgments

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TAXONOMY OF AXINIPHYLLUM (ASTERACEAE-HELIANTHEAE)

B. L. Turner
The University of Texas, Austin 78712

Axiniphyllum is a small herbaceous genus of four poorly known species of south-central Mexico (states of Guerrero and Oaxaca). It was erected by Bentham in 1872 to accommodate two rayless species, *A. corymbosum* and *A. tomentosum*, the former serving as the type for the genus. The latter species, however, had been described earlier under the name *Polymnia scabrum;* hence *Axiniphyllum scabrum* is the correct binomial for this taxon, as noted by Blake (1930).

I became interested in the genus through my efforts to position what appeared to be an unidentified *Rumfordia*. While it seemed close to *Axiniphyllum,* it possessed well-developed rays. *Rumfordia,* with well-defined ray florets, appeared more remote, except for the relatively recently proposed *R. pinnatisecta* (Wilson, 1958). The latter, however, seemed exceptional in *Rumfordia,* and careful comparisons of the 10 or more species of the latter genus and the two original species proposed by Bentham for *Axiniphyllum* have convinced me that Wilson erred in placing *R. pinnatisecta* in *Rumfordia. Rumfordia pinnatisecta* is much closer to *Axiniphyllum* and I have therefore transferred it to what I believe is its correct phyletic position, alongside the newly proposed *A. sagittalobum*.

As to the generic relationship of *Axiniphyllum,* Bentham (1872) noted that it was "in many respects allied to *Zaluzania* and *Sabazia.*" The latter genus is readily distinguished by its white rays, more delicate habit, non-clasping leaves, style branches, etc.; in short, the similarity is presumably superficial. The same may be said for the alternate-leaved *Zaluzania* (Olsen, 1977); Bentham, presumably, was unduly influenced by the epappose achenes of both genera.

I would relate *Axiniphyllum* to *Rumfordia* as would Sanders (1977), primarily through the two radiate species proposed here and the herbaceous *R. alcortae* Rzedowski. The latter, in most of its major characters (involucre, achenes, and style branches), is like *Rumfordia* but approaches *Axiniphyllum* in its habit, leaf shape and inflorescence. The following key serves to distinguish the two genera:

1. Style branches narrowly linear, prominently pubescent on the abaxial surfaces; apical appendage elongate, conical, as long as or longer than the style branch width; ray achenes 4-sided, not conspicuously radially flattened; outermost (5–6) involucral bracts densely stipitate-glandular, similar in shape and texture to those which they subtend . . . . . *Axiniphyllum.*
1. Style branches linear, glabrous or merely papillose on the abaxial surface; apical appendage short, half or less as long as the style branch width; ray achenes radially flattened, usually prominently so; outermost bracts 5, sharply relexed, not densely stipitate-glandular, markedly different in texture and shape from those within . . *Rumfordia.*

Axiniphyllum Benth.

Perennial herbs up to 1 m tall. Leaves opposite, connate, the blades coarsely pubescent and variously lobed. Heads 1– several in loose corymbose panicles. Involucral bracts imbricate in 2–3 series, the outer coarsely pubescent or glandular. Receptable nearly flat to short-conical, with well-developed, acute, scarious, 2–4 nerved paleae. Ray florets present or absent; when present, pistillate and fertile. Disk florets fertile with elongate, cylindric, 5-lobed limbs. Anther sacs obtuse at the base, the apical appendages narrowly ovate to ovate-cuspidate. Style branches linear-subulate, markedly short, pubescent on the exterior surfaces, the appendages elongate-conical, pubescent. Achenes black, glabrous, epappose. Chromosome number unknown.

Type species: *Axiniphyllum corymbosum* Benth.

Key to Species

1. Heads without ray florets (2)
   2. Heads small, 8–10 mm high; outermost involucral bracts 5-7 mm long . . . . . 1. *A. corymbosum*
   2. Heads large, 15–20 mm high; outermost involucral bracts 15–25 mm long . . . . . 2. *A. scabrum*

1. Heads with ray florets (3)
   3. Terminal lobe of leaf blade closely serrate, sagittate in outline; flowering heads 2–5, on ultimate peduncles 4–8 cm long . . . . . 3. *A. sagittalobum*
   3. Terminal lobe of leaf blade crenulate, variously shaped; flowering heads 6–30, on ultimate peduncles 2–3 cm long . . . . . 4. *A. pinnatisectum*

1. AXINIPHYLLUM CORYMBOSUM Benth., Hook Icon. Pl. 12:17. 1872. TYPE: MEXICO. OAXACA: "woods in the province of Oaxaca, at an elevation of 7500 feet", Sep 1840, *H. Galeotti 2089* (Holotype: K!).

Sparsely branched, perennial herbs up to 70 cm tall. Leaves sagittate, irregularly dentate or lobed to nearly entire, the petioles winged, auriculate, connate. Heads 8–10 mm high, arranged in a very loose corymbose panicle, the ultimate peduncles 2–5 cm long. Involucres 6–8 mm long, the bracts imbricate in 2–3 series, scabrous-pubescent to variously stipitate-glandular, often intermixed. Ray florets absent. Disk florets ca 40, fertile; corolla sparsely pubescent, ca 5 mm long; achenes epappose, glabrous, black, 4-sided, 2-3 mm long, ca 1 mm wide, the upper, broadest, portion quadroid in cross section.

DISTRIBUTION. Montane forests of south-central Mexico (Guerrero and Oaxaca) from 1800–2500 m, reportedly growing in the shade of

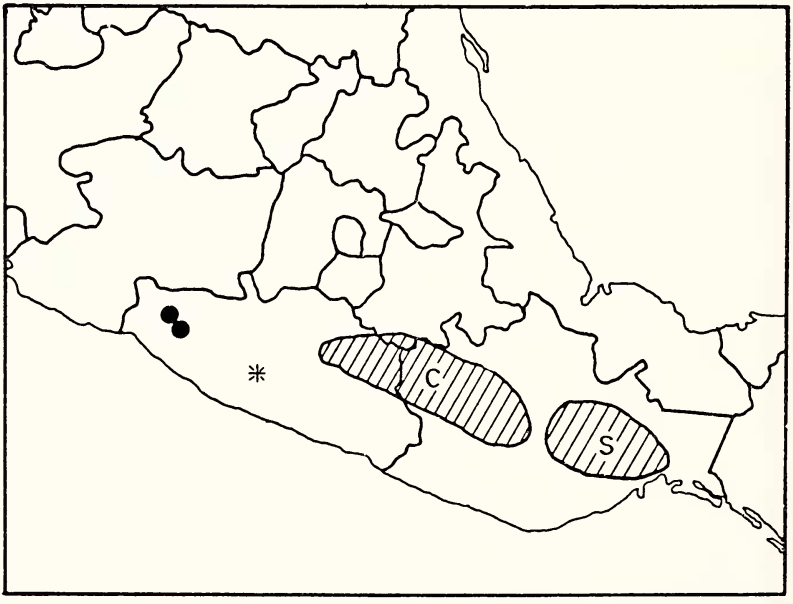

FIG. 1. Distribution of *Axiniphyllum* species: *A. corymbosum* (area surrounding C; *A. scabrum* (area surrounding S); *A. sagittalobum* (asterisk); *A. pinnatisectum* (dots).

oaks and pines as a "subherbacea anual geofita" (*Kruse 2666*), although the specimens concerned appear to have arisen from lignescent, perennial rootstocks. Sept.-Nov. (Fig. 1).

Additional specimens examined: MEXICO. GUERRERO: Mazatlán, cerro Alquitran, 7 Nov 1969, *Kruse 2666* (FM, US); without locality, *Sesse & Mociño "1490"* (fragment) also numbered *"2825"* (FM).

Bentham's description of the species was accompanied by a good drawing showing a somewhat more overly-pubescent corolla and a more congested inflorescence (because of the immature nature of the specimen) than is typical of the taxon. Mature achenes, as he noted, were lacking. However, in most other details, the few collections available to me match the holotype and drawings quite nicely, except for its reported annual habit, which is presumably an observational error to be attributed to the collector since this is so noted by appropriate symbol on his collection label. Galeotti also describes the corollas as "yellow & rosy" but recent collections by *Kruse* (*2666,* FM, US) describe the flowers as white, although in the dried state they appear to be somewhat on the yellow side.

2. AXINIPHYLLUM SCABRUM (Zucc.) Blake, Contrib. U.S. Nat. Herb. 26:248. 1930. *Polymnia scabra* Zucc., Abh. Akad. Wiss. München 1:313. 1832. TYPE: Grown in the Botanical Garden at Munich from seeds collected in Mexico by *Karwinsky s.n.,* 1829 (Holotype, M; isotypes, BM!, P; phototype US!).

Polymnia aspera Mart. ex DC., Prodr. 5:515. 1836 (Holotype, P). According to Blake, this name is based in part on portions of the above type, the specific epithet itself being a "slip of memory" on Martius' part, Zuccarini's earlier name having been intended.

Axiniphyllum tomentosum Benth., Hook. Icon. Pl. 12:17. 1872. TYPE: MEXICO: Without locality, 1846, *Bates s.n.* (Holotype, K; phototype US!).

Robust perennial herb up to 1 m tall. Leaves broadly sagittate, those at mid-stem as broad as or broader than long, scaberrimous above, densely canescent or tomentose beneath, irregularly dentate or lobed to nearly entire, the petioles winged, auriculate, connate. Heads 15–20 mm high, arranged in broad open corymbose panicles, the ultimate peduncles 1–7 cm long. Involucral bracts 2–3 seriate, densely stipitate-glandular, the 5 or 6 outermost bracts (15–25 mm long) equalling or exceeding the head proper, spreading or reflexed at maturity in the manner of *Rumfordia.* Ray florets absent. Disk florets numerous (50–80), fertile; corolla pubescent, 6–7 mm long, the limb abrupt, about twice as long as the tube; achenes epappose, 3–4 mm long, 1–2 mm wide, black, glabrous, 4-sided in cross section near the apex.

DISTRIBUTION. Known only from montane regions in the state of Oaxaca, Mexico, where it reportedly occurs in "weedy fields" and "shrubby slopes" in oak forest zones at about 2000 m. Aug-Nov. (Fig. 1).

Additional selected specimens examined: Oaxaca: 11.5 mi N of Telixtlahuaca, 6 Nov 1966, *Anderson & Laskowski 4138* (FM, GH); 5 mi NE of Mexican Highway 190, near Oaxaca, 26 Aug 1965, *Breedlove 12202* (US); hills near Oaxaca, Aug 1894, *Pringle 4826* (FM); Sierra de San Felipe, 8 Sep 1894, *Smith 284* (FM, US).

This is a very distinct taxon, easily recognized by its large heads with prominent, often reflexed, outer involucral bracts. It is apparently relatively common in spite of its restricted distribution, being known by at least 10 separate collections from among the herbaria from which I borrowed.

3. **Axiniphyllum sagittalobum** Turner, sp. nov.
Type: MEXICO. Guerrero: Districta Mina, Toro Muerte, 2800 m, 30 Oct 1939, *G. B. Hinton et al. 14761* (Holotype, LL; isotypes, MICH, NY, US).

Herbae perennae (?) ad 1 m altae caulibus saepe rigide erectibus unusuquisque 2–5 capitata. Folia irregulariter lyrata vel repanda parte terminali sagittata irregulariter serrata utrinque pubescentia pilis brevibus crispatis. Pedunculi 5–8 cm longi stipitato-glandulares. Flores radiati 8, pistillati fructiferi ligulis "luteolis" ca 8 cm longis, 5–6 mm latis apice trilobatis. Flores disci ca 40 hermaphroditi fructiferi. Styli rami complanati lineario-lanceolati subtus pubescentes lineis stigmaticis infine bene evolutis sed apicem versus gradatim cum appendice terminali confluentibus. Achaenia uniformia nigra glabra pappis nullis.

Perennial (?) herb up to 1 m high, the stems mostly stiffly erect, glabrate and unbranched. Leaves opposite, connate, irregularly lyrate to repand, the terminal portion sagittate, irregularly serrate, pubescent on both sides with short, crisp, hairs, especially along the veins. Heads 2–5 to a stem, borne upon elongate stipitate-glandular peduncles, 5–8 cm long; involucre 2–3 seriate, the outermost whorls linear-lanceolate, densely stipitate-glandular, variously reflexed with age. Receptacle chaffy, puberulent, short-conical, knobby (with age). Ray florets 8, pistillate, fertile, "pale yellow", the ligules ca 8 mm long, 5–6 mm wide, 3-lobed at the apex; tube ca 2 mm long, densely pubescent with both glandular and nonglandular, uniseriate trichomes. Disk florets ca 40, perfect, fertile; corolla 5–6 mm long; tube ca 1.5 mm long, the limb abruptly ampliate, 5-lobed, sparsely pubescent. Style branches flat, linear lanceolate, pubescent beneath, the stigmatic lines well developed below but gradually merging into the acuminate appendage. Ray and disk achenes similar, falcate (the outermost) to clavate, black, glabrous, epappose.

Distribution: Known only from the type collection.

The species is undoubtedly closely related to *Axiniphyllum pinnatisectum* but can be readily distinguished by its sagittate, markedly ser-

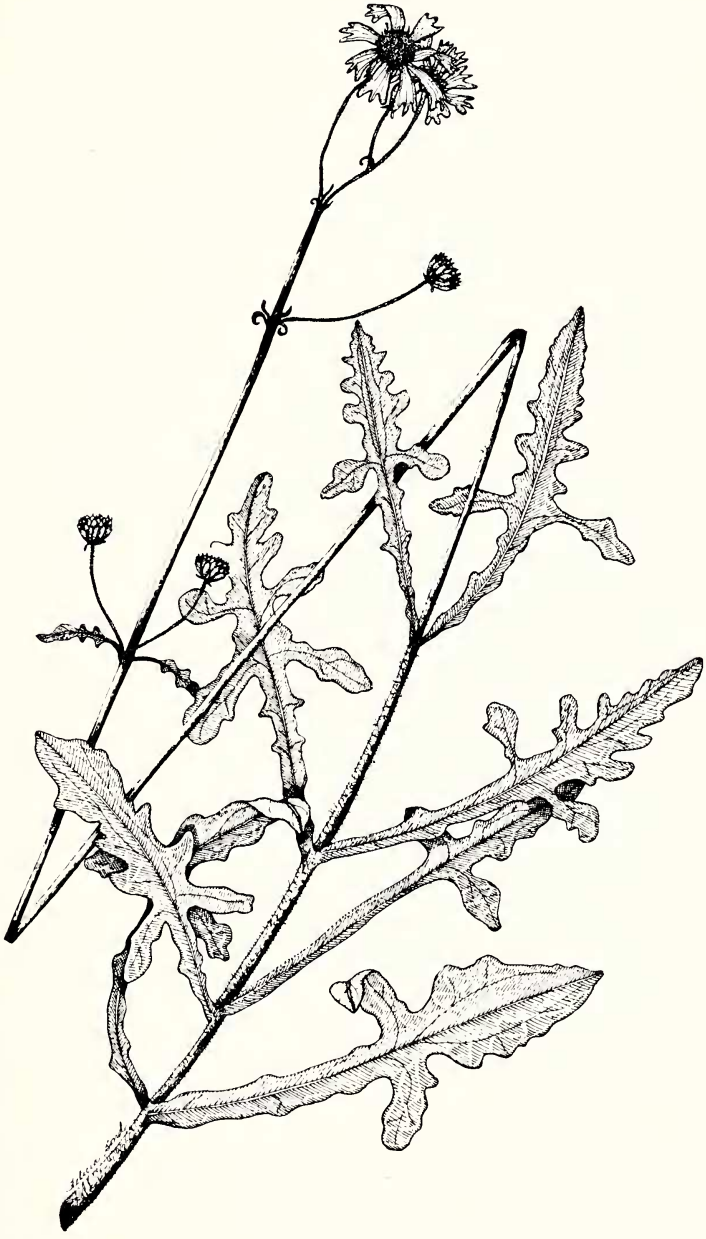

FIG. 2. Habit sketch of *Axiniphyllum pinnatisectum* (X ½). *Hinton 9756* (MICH).

rate, terminal leaf lobes, somewhat larger heads and more conspicuous outer involucral bracts. However, both of these taxa are too poorly represented in herbaria to speculate upon the constancy of these characters and additional collections showing populational intergradation might mark these as no more than varietally distinct. A wide range of pinnatified leaf forms is found among the isotypes of this taxon but none approaches that found in *A. sagittalobum*.

4. **Axiniphyllum pinnatisectum** (P. G. Wilson) Turner, comb. nov. (Fig. 2). *Rumfordia pinnatisecta* P. G. Wilson, Kew Bull. 1958:164. 1958. TYPE: MEXICO. GUERRERO: Mina Dist., Aguazarca-File, pine forest, 30 Nov 1937, *Hinton et al. 11289* (Holotype, K!; isotopes NY!, US!).

Perennial herb up to 1.5 m in height. Similar to *Axiniphyllum sagittalobum* but readily distinguished by the characters listed in the key to species.

DISTRIBUTION: Known only from the state of Guerrero where it reportedly occurs in pine forests at ca 2300 m elevation. Oct-Nov. (Fig. 1).

Additional specimens examined: GUERRERO: Dist. Mina, Armenia, pine forests, 2340 m, 23 Oct 1936, *Hinton et al. 9756* (GH, NY, TEX, US).

Wilson presumably relegated this species to the genus *Rumfordia* largely because of its radiate heads. In most other characters, however, it is much closer to *Axiniphyllum corymbosum* and I find no hesitation in making the necessary transfer.

ACKNOWLEDGMENTS

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